

TECHNICAL MANUAL

CLEANING AND CORROSION CONTROL

**VOLUME II
AIRCRAFT**

This publication supersedes NAVAIR 01-1A-509-2/TM 1-1500-344-23-2, dated 15 April 2009.
Includes IRAC 2.

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PUBLISHED BY DIRECTION OF COMMANDER, NAVAL AIR SYSTEMS COMMAND

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Total number of pages in this manual is 250, consisting of the following:

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A	0	3-16 Blank	0	B-4 Blank	0
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ii - v	0	4-24 Blank	0	B-6 Blank	0
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TPDR-1	0	7-1 - 7-27	0	B-20 Blank	0
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HMWS-1 - HMWS-6	0	8-1 - 8-10	0	B-28 Blank	0
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*Zero in this column indicates an original page.

CHAPTER 7 SEALANTS

7-1. PURPOSE. This chapter covers recommended materials and procedures for the application of sealing compounds to aircraft structures. Sealants prevent the intrusion of moisture, rain, salt water, dust, and aircraft fluids, which can lead to extensive corrosion and possibly equipment failure. Sealants are one of the most important tools for corrosion prevention and control. For sealants to be effective, it is critical that the correct sealant be chosen for a specific area/situation and that it be applied correctly. Only qualified personnel thoroughly familiar with sealants and their application shall be permitted to handle and apply them.

7-2. REASONS FOR SEALING. Sealants are used for the following purposes:

- a. Fuel sealing (integral fuel tanks).
- b. Pressure area sealing (cabin areas and access doors).
- c. Weather sealing (exterior skin surfaces).
- d. Firewall sealing (engine and ordnance areas).
- e. Electrical insulation and sealing (bulkhead wiring, electrical connectors, and electrical components).
- f. Acid-resistant sealing (battery compartments and relief tanks).
- g. Window sealing (windshield and canopy).
- h. High temperature sealing (engine areas, anti-icing ducts, and some electronics).
- i. Aerodynamic smoothing (void filling) and sealing (exterior skin surfaces).
- j. Sealing conductive gaskets (communication and navigation antennas and static wicks).
- k. Corrosion inhibition.

7-3. SEALANT PACKAGING. Sealants are generally packaged and available as three different units of issue (U/I):

a. Two Part Can Kit (KT): A kit consists of a curing agent (part A) and a base compound (part B) that are pre-measured into separate containers. The entire contents of both containers are intended to be mixed at one time. Accurate weighing equipment shall be used to achieve the correct mix ratio for smaller mixes.

b. Semkit Cartridge (CA): The Semkit is a complete plastic cartridge assembly that stores, mixes, and applies sealant materials. Semkit packages are convenient because they eliminate the need to measure and handle materials, prevent contamination when opening and closing can kits, and reduce air entrapment which causes voids in mixed sealant.

c. Premixed and Frozen (PMF): The sealant is supplied pre-measured, mixed, and frozen at extremely low temperatures. PMF sealants are the most convenient package configuration for high usage applications; however, freezer storage must be available. PMF sealants are available in a variety of sizes, but the 2½ ounce and 6 ounce are the most common.

7-4. SEALING COMPOUNDS AND MATERIALS.

Table 7-1 lists approved sealing compounds, their properties, and intended use. Refer to the applicable aircraft/equipment maintenance manual and paragraph 7-7 for specific information concerning proper application of sealing compounds. Also, observe the warnings and cautions in paragraph 7-7 when using any sealing compound. If use of a sealant is required, and no specific instructions are available, the Sealant Decision Tree (Figure 7-1) may be used as a guideline to determine the most appropriate sealant.

7-4.1. POLYSULFIDE AND POLYTHIOETHER SEALING COMPOUNDS.

These materials consist of two components: the base compound (containing the prepolymer) and the accelerator (containing the curing agent). When thoroughly mixed, the accelerator cures the prepolymer to a rubbery solid. Rates of cure depend on the type of prepolymer, accelerator, temperature and humidity; full cure may not be achieved for as long as 7 days.

Table 7-1. Sealing Compounds

SPECIFICATION	PROPERTIES	INTENDED USE
TWO COMPONENT SEALANTS		
MIL-PRF-81733 Class 1 Sealing and Coating Compounds, Corrosion Inhibitive	Polysulfide sealant Room temperature cure Service temp: -65°to 250°F Peel strength: 15 lb/in (min) Contains corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Sealing faying surfaces and wet installation of fasteners on permanent structure. Not intended for use as an integral fuel tank sealant. Grade A: chromated corrosion inhibitors Grade B: non-chromated corrosion inhibitors
AMS-S-8802 (supersedes MIL-S-8802) Sealing Compound, Temperature Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion	Polysulfide sealant Room temperature cure Service temp: -65°to 250°F Peel strength: 20 lb/in (min) No corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Sealing faying surfaces, overcoating fasteners, sealing joints and seams, fillet and brush sealing of integral fuel tanks and fuel cell cavities. Should not be exposed to fuel or overcoated until tack-free. Type I is the most commonly used.
AMS 3265 Sealing Compound, Polysulfide Rubber, Fuel Resistant, Non-Chromated Corrosion Inhibiting, for Intermittent Use to 360°F	Polysulfide sealant Room temperature cure Service temp: -65°to 250°F Peel strength: 20 lb/in (min) Contains corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Cabin pressure sealing, aerodynamic smoothing, fillet sealing, overcoating fasteners, sealing joints and seams. Prior to sealing, treat bond surfaces with AMS 3100 adhesion promoter to enhance sealant adhesion. Can be used as an alternate to MIL-PRF-81733.
AMS 3276 (supersedes MIL-S-83430) Sealing Compound, Integral Fuel Tanks and General Purpose, Intermittent Use to 360°F	Polysulfide sealant Room temperature cure Service temp: -65°to 250°F Peel strength: 20 lb/in (min) No corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Fuel tank sealing, cabin pressure sealing, aero-dynamic smoothing, faying surface sealing, wet installation of fasteners, overcoating fasteners, sealing joints and seams, and non-structural adhesive bonding. Prior to sealing, treat bond surfaces with AMS 3100 adhesion promoter to enhance sealant adhesion.
AMS 3277 (supersedes MIL-S-29574) Sealing Compound, Polythioether Rubber, Fast Curing for Integral Fuel Tanks and General Purpose, Intermittent Use to 400°F	Polythioether sealant Low and ambient temperature cure Service temp: -80°to 320°F Peel strength: 20 lb/in (min) No corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Multi-purpose aircraft structure and integral fuel tank sealant with rapid ambient and low temperature curing capability. Type 1 must be used with recommended adhesion promoter. Not recommended for use with plastics.
AMS 3284 (supersedes AMS 3267) Sealing Compound, Low Adhesion, Corrosion Inhibiting, for Removable Panels and Fuel Tank Inspection Plates	Polysulfide sealant Room temperature cure Service temp: -65°to 250°F Peel strength: 4 lb/in (min) Type 1: No corrosion inhibitors Type 2: Non-chromated corrosion inhibitors Resists fuel & aviation gas	Fillet and faying surface sealing of removable structure, such as access doors, floor panels and plates, removable panels, and fuel tank inspection plates. Not for high temperature areas or permanent structure.

Table 7-1. Sealing Compounds (Cont.)

SPECIFICATION	PROPERTIES	INTENDED USE
ONE COMPONENT SEALANTS		
MIL-A-46146 Adhesive - Sealants, Silicone, RTV, Non corrosive	Silicone sealant Room temperature cure Service temp: Group I & II: -70° to 400°F Group III: -70° to 600°F No corrosion inhibitors Not fuel or oil resistant	Convenient sealant for use with sensitive metals and electronic equipment. Do not use where resistance to fuels, oils, or hydraulic fluids is required. Each group comes in two types: Type I: paste Type II: self-leveling liquid
AMS 3374 (supersedes MIL-S-38249) Sealing Compound, Aircraft Firewall, Silicone	Silicone sealant Room temperature cure Service temp: -65° to 400°F Peel strength: 10 lb/in (min) No corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Sealing firewall structures exposed to very high temperatures against the passage of air and vapors. Can withstand flash temperatures up to 2000°F. Type I is the most commonly used.
SPECIALTY SEALANTS		
AMS 3255 Sealing Tape, Polytetrafluoroethylene, Expanded (ePTFE)	Preformed tape with adhesive No mixing, masking, or curing required Service temp: -65° to 450°F No corrosion inhibitors Resists fuel, oil, & hydraulic fluid	Sealing of faying surfaces, access panels, floorboards, and windscreens where gaskets are required. Non-hazardous material alternative to two component sealants. Tape intended for areas exposed to aircraft fluids (fuel, oils) should be applied with fluid resistant rubber cement. Available in two classes: Class 1: Continuous, ribbed Class 2: Continuous, non-ribbed
Reinforced Polyurethane Gel Sealing Tape (HI-TAK Tape@TufSeal™)	Preformed tape No mixing, masking, or curing required Service temp: -65° to 250°F No corrosion inhibitors Not fuel or oil resistant	Environmental sealing of floorboard faying surfaces. Not for fuel or hydraulic fluid-soaked or high temperature applications. Non-hazardous alternative to standard two component sealants and an alternative to ePTFE Sealing Tapes for floorboards.

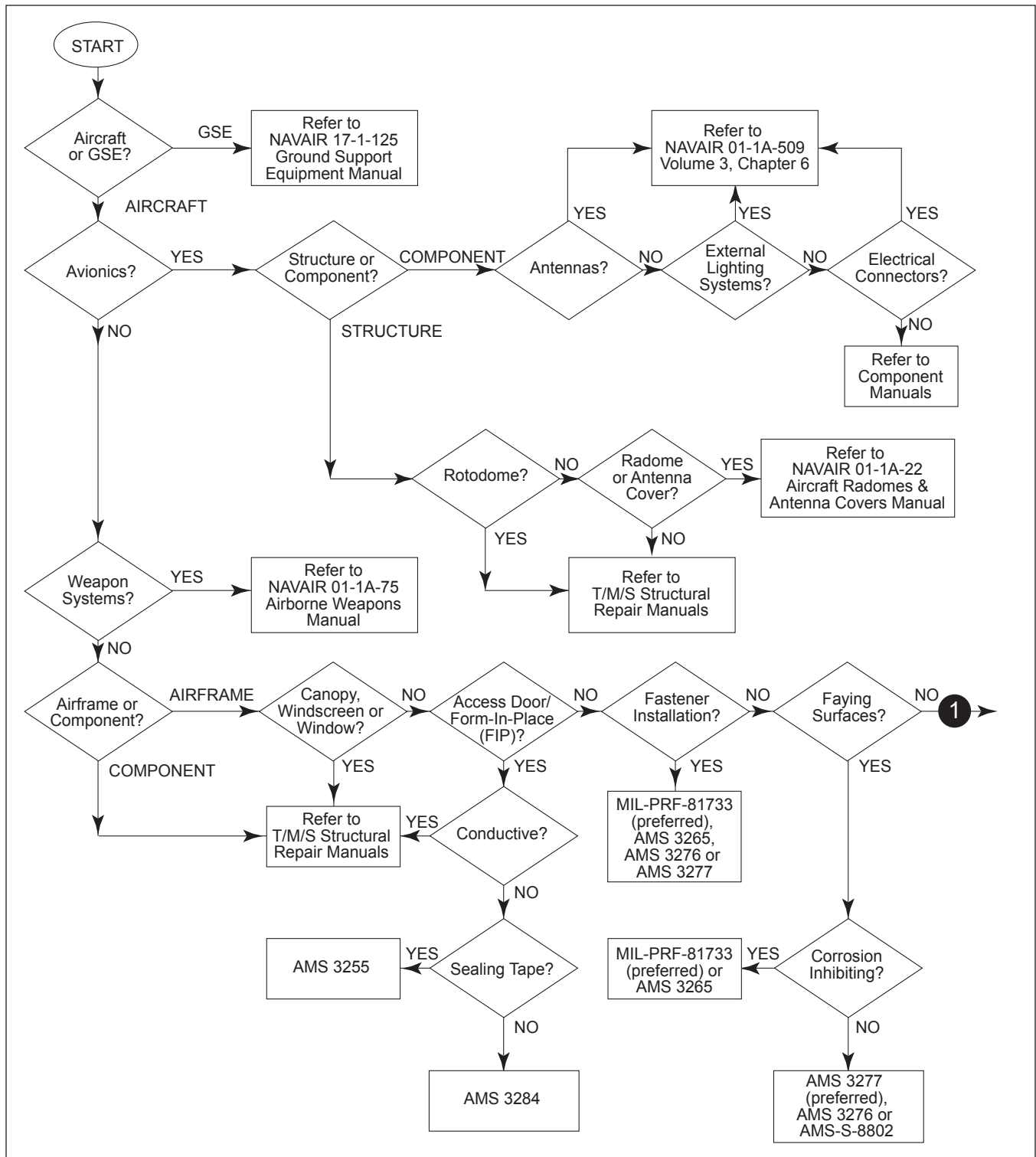


Figure 7-1. Sealant Decision Tree (Sheet 1 of 2)

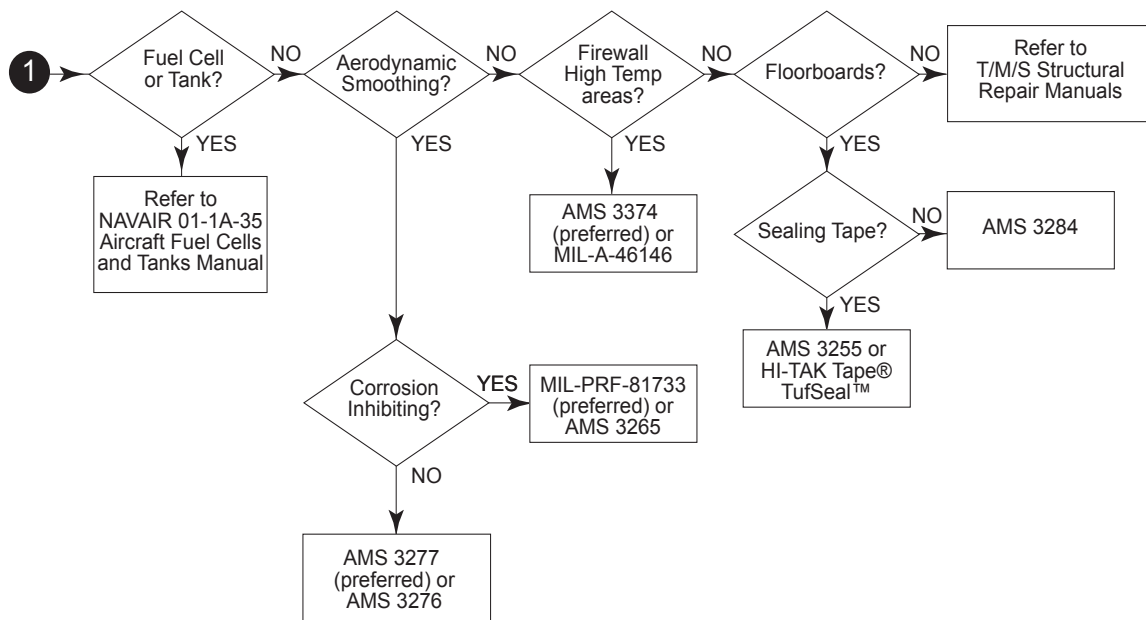


Figure 7-1. Sealant Decision Tree (Sheet 2)

CAUTION

MIL-A-46106 materials shall not be used on aircraft or components. MIL-A-46106 can be identified by its vinegar-like smell. If RTV sealants are required by the structural repair manual (SRM), ensure that the sealant conforms to MIL-A-46146, or is a noncorrosive, authorized sealant.

7-4.2. SILICONE SEALING COMPOUNDS. Room temperature vulcanizing (RTV) silicones generally consist of one component which cures by reacting with moisture in the air. If silicones are applied too thickly or in such a way as to prevent moisture from entering the material, they may not cure at all. In addition, many unauthorized silicone sealing compounds produce acetic acid (identified by a vinegar smell) while curing, which can lead to severe corrosion problems. There are two silicone sealant specifications, MIL-A-46146 and MIL-A-46106. Only MIL-A-46146 materials are noncorrosive.

NOTE

Use of the ePTFE sealing tape requires authorization from the cognizant Type, Model, Series (TMS) engineering authority for the aircraft.

7-4.3. ePTFE SEALING TAPE (AMS 3255). The ePTFE (expanded polytetrafluoroethylene) sealant tape consists of an extruded gasket with a pressure sensitive adhesive backing. No mixing is required and there are no application life constraints or cure times. The sealing tape does not require removal and replacement unless damaged. The adhesive backing is only required to hold the sealing tape in place until an access panel is (re)installed. Tapes may be special ordered without adhesive backing for use in areas where fluid exposure (e.g. hydraulic fluid or fuel) is expected; such tape is applied with a fluid resistant rubber cement such as MMM-A-189.

7-4.4. REINFORCED POLYURETHANE GEL SEALING TAPE. These tapes consist of a preformed polyurethane gel reinforced with a loose fiberglass weave and a thin translucent backing. No mixing is required and there are no application life constraints or cure times. The sealing tape does not require removal

and replacement unless damaged. Integrity of the tape is affected by long-term exposure to hydraulic fluids and oils, which cause swelling and softening. Exposure to fluids will not degrade corrosion protection but may reduce reusability and make removal messy. Tapes may be ordered in a variety of widths, indicated by the last three numbers in the part number (i.e. IS-HT3000-015 is 1½ inches wide).

7-4.5. CONDUCTIVE SEALANTS AND GASKETS.

7-4.5.1. Conductive sealants are used on newer aircraft to maintain electrical pathways. Consult the T/M/S maintenance manual to identify areas where these sealants are required.

7-4.5.2. Conductive sealants and gaskets used for weather sealing antennas and static discharge wicks and materials for weather sealing mated connectors are discussed in Volume III.

CAUTION

Use only those primers or adhesion promoters recommended by the manufacturer for their products.

NOTE

Solvent based adhesion promoters are hygroscopic (absorb moisture) and must be kept away from moisture. Discard material if it becomes cloudy or a precipitate has formed.

7-4.6. ADHESION PROMOTERS. Some sealing compounds require the application of a special primer or adhesion promoter prior to sealant application in order to develop a good adhesive bond with the surface. Adhesion promoters are one part, water or solvent-based compounds which, after drying, leave behind coupling agents which promote adhesion with certain sealants. Adhesion promoters are especially important when using AMS 3277 Type I, AMS 3276, and most silicone based sealants. It is essential that AMS 3100 adhesion promoter be used before new sealant is applied over aged, fuel soaked polysulfide sealant. In all cases where polythioether sealants (e.g. AMS 3277) are applied over polysulfide sealants (e.g. AMS-S-8802), especially in integral fuel tanks, a polythioether adhesion promoter is required for use at the sealant interface.

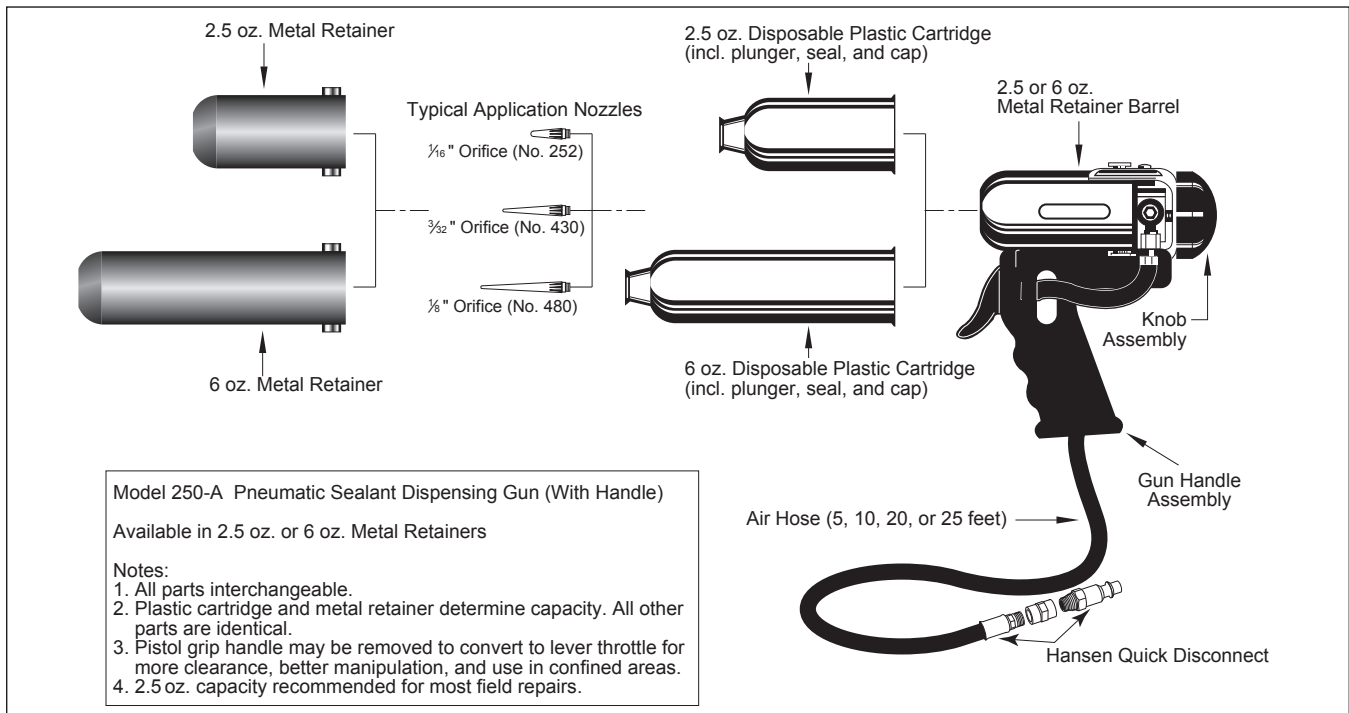


Figure 7-2. Pneumatic Sealant Gun

CAUTION

Some applications require the use of a specific release agent. Consult the maintenance manual prior to application of a release agent.

7-4.7. **RELEASING/PARTING AGENT.** MIL-PRF-16173 Grade 4, MIL-PRF-32033, VV-P-236 (Petrolatum) or Partall #10 can all be used as release agents for sealant applications by applying a very thin film. Do not allow release agent to contact any surface(s) where sealant is to adhere. Sealant will not adhere to surfaces coated with release agent. If contact surface to be sealed becomes contaminated with the release agent, remove the release agent using a clean cloth moistened with an approved solvent. Reapply adhesion promoter as necessary.

7-5. SEALING EQUIPMENT. The following sealing equipment is available.

7-5.1. **SEALANT GUN.** Sealant guns are available for both pneumatic and manual application of sealants, adhesives, and potting compounds (see Figures 7-2 and 7-3). The Semco Model 250-A gun, or equivalent, is fitted with one of the nozzles from Figure 7-4 and used for the application of fillet seals. When using a sealant

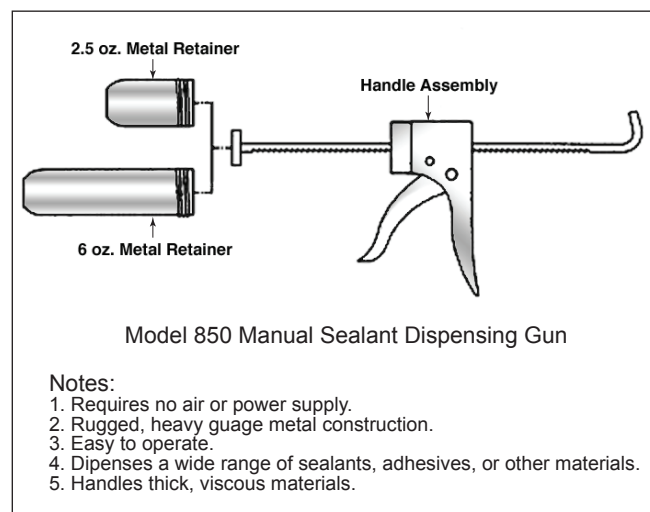


Figure 7-3. Manual Sealant Gun

gun, the nozzle tip must be pointed into the seam and maintained at a 45 degree angle to the line of travel, forcing the bead of sealant to precede the gun tip to minimize entrapment of air. Use fairing/smoothing tools (i.e., spatulas and spreaders) shown in Figure 7-5 to work sealants into seams.

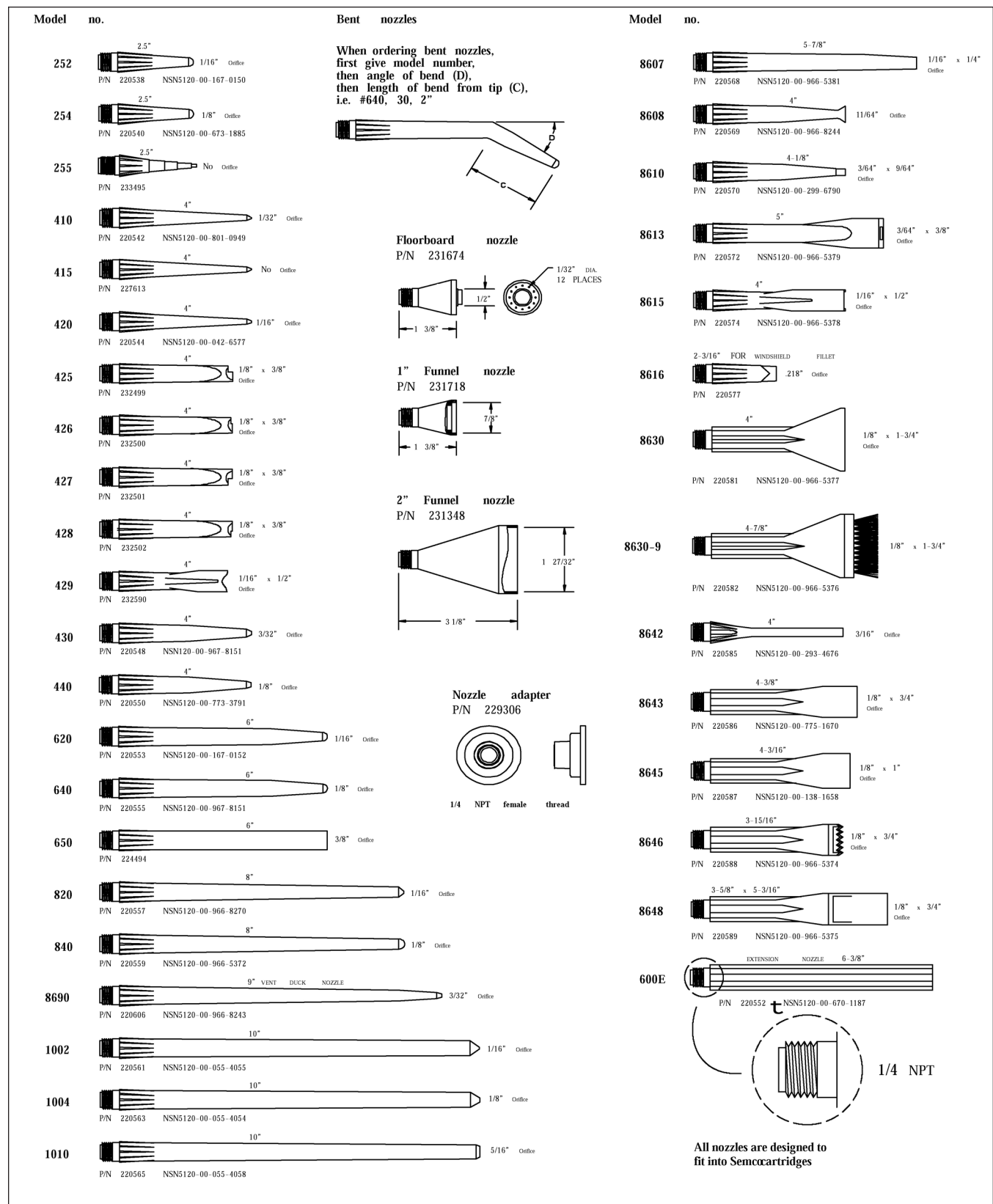
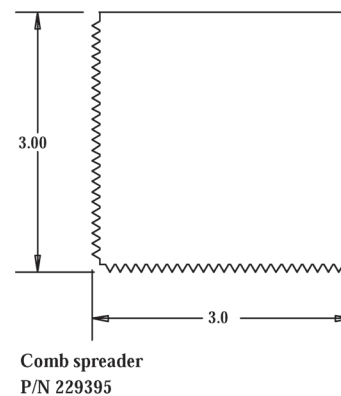
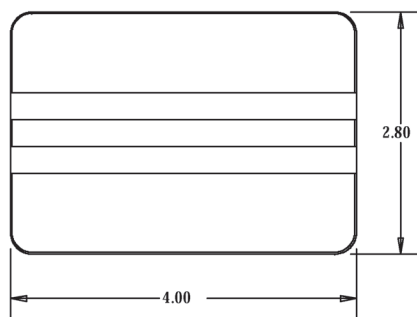
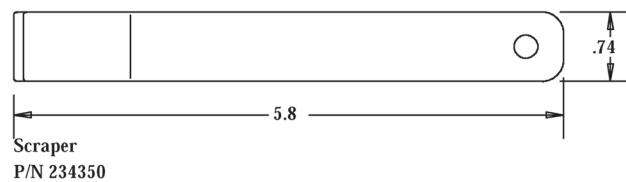
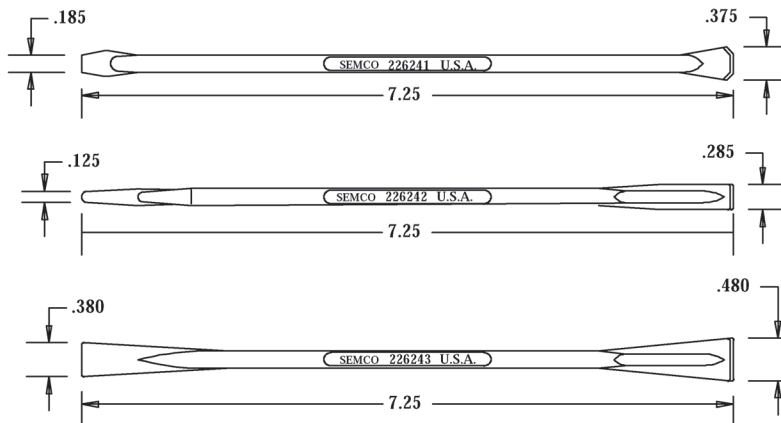
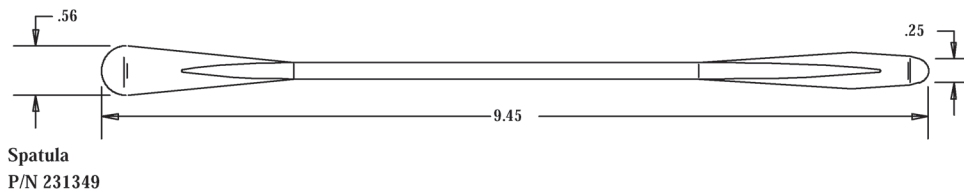


Figure 7-4. Sealant Application Nozzles

Fiberglass reinforced plastic spatulas and spreaders
for smoothing sealants and adhesives.



All dimensions shown are in inches.

Figure 7-5. Sealant and Adhesive Smoothing Tools

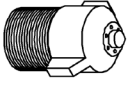
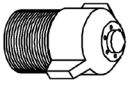
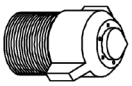
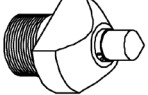
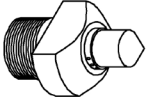
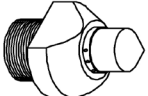

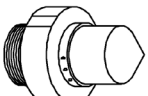
CAUTION

Care shall be taken when using rivet nozzles to prevent sealant material from filling fastener holes.

7-5.2. **APPLICATION NOZZLES**. In addition to the standard, fillet, and ribbon nozzles in Figure 7-4, the countersink and rivet nozzles in Figures 7-6 and 7-7, respectively, can also be used with the sealant guns. Countersink nozzles are used to apply sealants into the countersink of fastener holes prior to fastener installation. Rivet nozzles are used to apply sealants

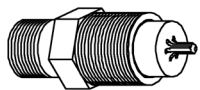
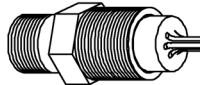
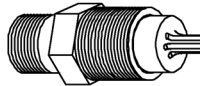
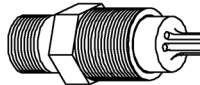
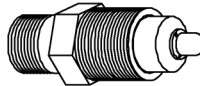
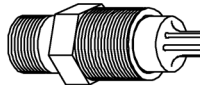
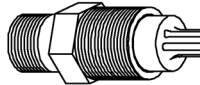
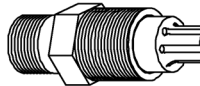
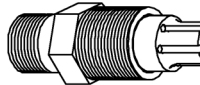
through the hole prior to fastening parts with rivets. The rivet nozzles have a spring-loaded tip, which serves as a check valve and allows for dispensing a precise amount of sealant material.

7-5.3. **HIGH PRESSURE INJECTION GUN**. Figure 7-8 illustrates high pressure injection guns used for injecting sealant into confined holes, slots, structural voids, and joggles, including channel sealing. Follow the procedures outlined in the aircraft SRM for the proper preparation and use of these guns. For hard to reach areas, attach an extension nozzle to the injection tip.

	Part number	Color	Size	Quantity holes
	233244	Red	3/32" - 1/8"	6 holes
	233243	White	3/16" - 1/4"	6 holes
	233451	Blue	5/16" - 3/8"	6 holes
	231319	Yellow	1/4" hole	6 holes - .028"
	231320	Grey	5/16" hole	6 holes - .028"
	231321	Green	3/8" hole	6 holes - .028"
	231560	Red	7/16" hole	6 holes - .028"
	231559	Blue	1/2" hole	4 holes - .028"

NOTE: Fastener sealing (countersink) nozzles are used to apply the required amount of sealant in the countersink of fastener holes, prior to installation of fastener. When properly used, sealant will be applied to the perimeter of the countersink and not inside the hole. The assorted fastener sealing nozzle sizes are color coded for identification.

Figure 7-6. Countersink Application Nozzles

		Part number	Color	Fits hole size	Size and quantity of dispensing holes
	3/32"	234285	Germaine green	3/32"	.030" dia., 6 ea. equally spaced
	1/8"	226837	Blue	1/8"	.031" dia., 6 ea. equally spaced
	5/32"	226838	Black	5/32"	.035" dia., 6 ea. equally spaced
	3/16"	226839	White	3/16"	.060" dia., 6 ea. equally spaced
	3/16" - 120_	234260*	Green	3/16" - 120_	.030" dia., 6 ea. equally spaced
	7/32"	234284	Light Blue	7/32"	.046" dia., 6 ea. equally spaced
	1/4"	226840	Red	1/4"	.044" dia., 6 ea. equally spaced
	5/16"	233051	Orange	5/16"	.062" dia., 6 ea. equally spaced
	3/8"	233052	Yellow	3/8"	.062" dia., 6 ea. equally spaced

*P/N 234260 applies sealant to countersink only.

NOTE: Rivet nozzles are used to apply the required amount of sealant into the counter-sink and through hole prior to fastening parts with rivets. The spring-loaded tip of the rivet nozzle acts as a check valve allowing precise shots of material to be dispensed. The assorted sizes are color coded for easy identification.

Figure 7-7. Rivet Application Nozzles

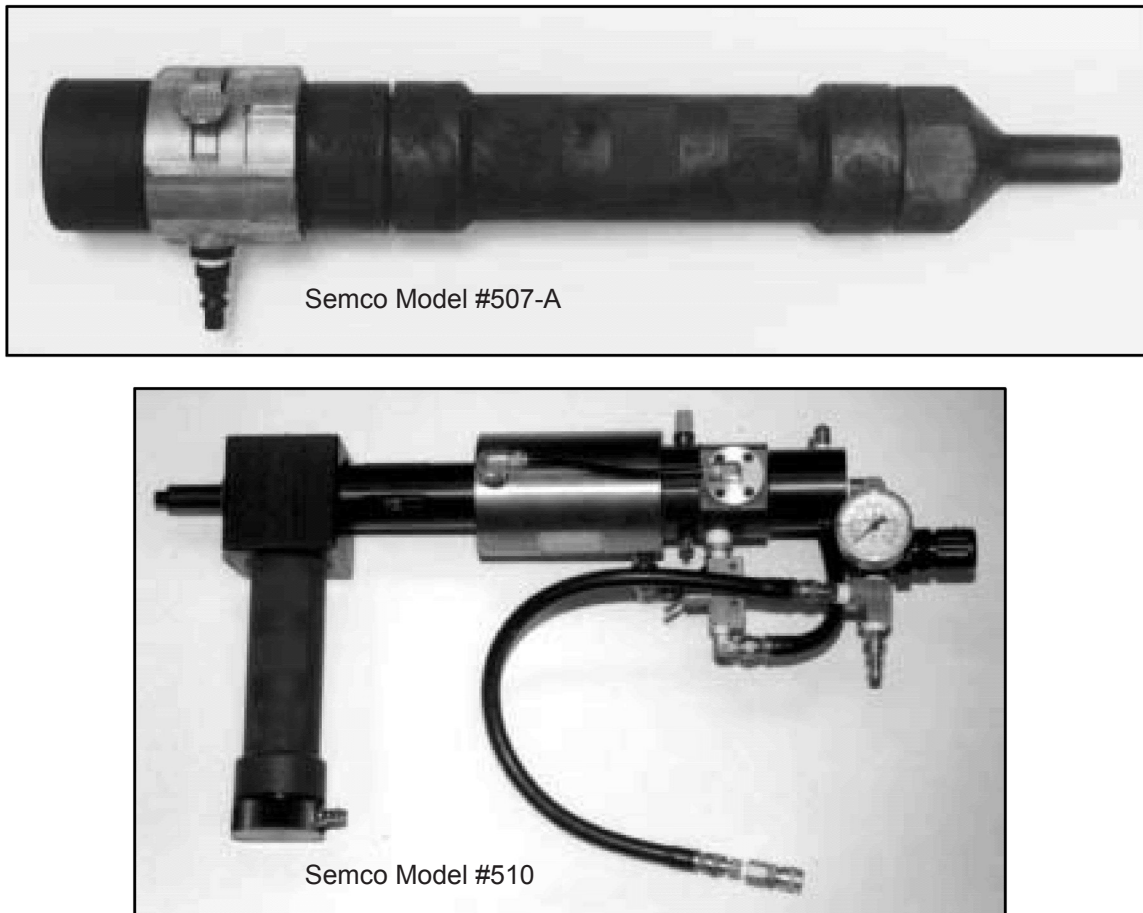


Figure 7-8. High-Pressure Sealant Injection Guns

7-5.4. SEALANT KITS (SEMKIT OR TECHKIT). Most sealants are available as ready to use kits (Semkits or Techkits). These kits are compact, two-part mixing application units designed for convenient storage, easy mixing, and proper application of the sealant in small quantities. The base sealant is packaged in standard 2½ ounce and 6 ounce cartridges which are placed in a sealant gun for application. There are two styles: the Barrier style, which holds proportioned amounts of the two components separated by an aluminum barrier; and the Injection style, which stores the accelerator material within the injection rod to separate it from the base compound prior to use (Figure 7-9). When using Semkits or Techkits, note that the handle or dasher

contains a pre-measured amount of accelerator and should be retained until the ramrod has been operated to release the seal at the bottom of the dasher. All of the material contained inside the two-component Semkit or Techkit package is mixed within the cartridge.

7-5.5. SEALANT APPLICATION TOOLS. When applying or fairing out sealants and adhesives, use the smoothing tools shown in Figure 7-5. These tools are commonly used in sealing maintenance work, but other tools may be manufactured/fabricated as needed to fit a specific situation. Only phenolic/plastic material shall be used to manufacture sealant application tools.

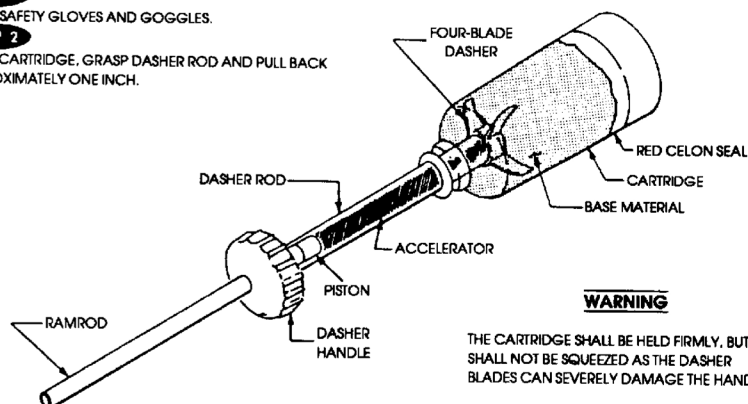
PREPARE PREPACKAGED SEALANT INJECTION CARTRIDGES FOR USE AS FOLLOWS

STEP 1

WEAR SAFETY GLOVES AND GOGGLES.

STEP 2

HOLD CARTRIDGE, GRASP DASHER ROD AND PULL BACK APPROXIMATELY ONE INCH.



NOTE

USE EVEN PRESSURE, DO NOT USE FORCE, TAP, POUND OR JOLT RAMROD IF PISTON DOES NOT BREAK LOOSE READILY.

STEP 3

INSERT RAMROD INTO HOLLOW OF DASHER ROD, BREAK PISTON LOOSE AND INJECT ABOUT 1/3 OF THE CONTENTS INTO THE CARTRIDGE.

NOTE

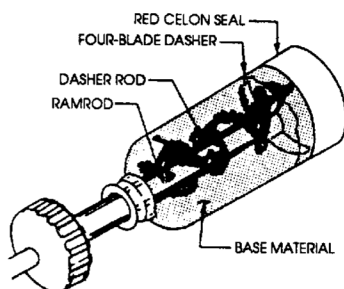
THE RAMROD WILL BE FULLY INSERTED INTO THE DASHER ROD WHEN ALL OF THE ACCELERATOR HAS BEEN FORCED INTO THE CARTRIDGE.

STEP 4

REPEAT STEPS 2 AND 3 UNTIL ALL OF THE CONTENTS OF THE ROD ARE EMPTIED INTO THE CARTRIDGE. THEN REMOVE RAMROD.

STEP 5

REMOVE AND DISCARD RAMROD.



STEP 6

BEGIN MIXING OPERATION BY ROTATING DASHER ROD IN A CLOCKWISE DIRECTION, WHILE SLOWLY MOVING DASHER ROD TO FULL "OUT" POSITION.

WARNING

THE CARTRIDGE SHALL BE HELD FIRMLY, BUT SHALL NOT BE SQUEEZED AS THE DASHER BLADES CAN SEVERELY DAMAGE THE HAND.

CAUTION

THE MIXING MUST BE DONE BY A CLOCKWISE ROTATION OF THE DASHER ROD. COUNTERCLOCKWISE ROTATION MUST NOT BE USED, BECAUSE THE FOUR BLADE DASHER INSIDE THE CARTRIDGE WILL UNSCREW FROM THE DASHER ROD.

STEP 7

CONTINUE CLOCKWISE ROTATION AND SLOWLY MOVE DASHER ROD TO FULL "IN" POSITION.

CAUTION

A MINIMUM OF FIVE FULL CLOCKWISE REVOLUTIONS MUST BE MADE FOR EACH FULLY "OUT" STROKE AND FOR EACH FULLY "IN" STROKE OF THE DASHER ROD. MIX MATERIAL FOR THE NUMBER OF STROKES RECOMMENDED BY THE MATERIAL MANUFACTURER IN THEIR MIXING INSTRUCTIONS.

STEP 8

END MIXING ACTION WITH DASHER ROD IN FULL "OUT" POSITION.

STEP 9

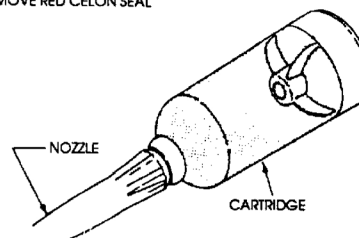
WHILE HOLDING CARTRIDGE IN AN UPRIGHT POSITION, UNSCREW DASHER ROD BY GRIPPING DASHER BLADES IN AREA OF RED CELON SEAL AND TURNING DASHER ROD COUNTERCLOCKWISE.

STEP 10

SCREW NOZZLE INTO CARTRIDGE IF SEALANT FILLETING GUN IS TO BE USED.

STEP 11

REMOVE RED CELON SEAL



STEP 12

INSERT CARTRIDGE INTO APPLICABLE SEALANT GUN. REFER TO SEALANT GUNS.

Figure 7-9. Injection Style Semkit

7-6. TWO COMPONENT SEALANT MIXING AND HANDLING. The proper weighing and mixing of components is essential to assure proper curing and adhesion of sealants. Difficulties with polysulfide and polythioether sealants are frequently caused by incomplete mixing or inaccurate weighing.

CAUTION

Sealants are sensitive to mix ratio and will not cure or perform properly if incorrectly mixed

7-6.1. WEIGHING AND MIXING. Mixing shall be accomplished in one central area in each organization. Polysulfide and polythioether sealants consist of two separately packaged components, a base compound (part B) and an accelerator (part A) in 6 ounce, 12 ounce, and 24 ounce kits. The base to accelerator ratio varies with different manufacturers. It is important, therefore, to mix the material according to the manufacturer's instructions. Use a weight scale to accurately measure the materials before mixing. Add the accelerator to the base in the correct ratio and mix until a uniform color is obtained. Slow mixing by hand is recommended for two part can kits. A high speed mechanical mixer should not be used, as internal heat will be generated, reducing application life and introducing air into the mixture. Mix a Semkit or Techkit in accordance with manufacturer's mixing instructions.

CAUTION

Do not use any two-part sealant after it has been mixed and its rated application time has expired, as poor adhesion may result.

7-6.2. APPLICATION TIME AND CURE TIME. Sealant application time and cure time are dependent upon ambient environmental conditions. Maintenance personnel should be aware of the effects of temperature and humidity on the application time of a sealant. Mix only the amount of material that can be applied during the rated application (work) time of the sealant. This time (in hours), known as a dash number, is denoted as the last number in a sealant designation (e.g. MIL-PRF-81733 Type II-2 has an application time of two hours). Table 7-2 indicates application times, tack-free times, and full cure times for each sealant type and dash number at 75°F (24°C) and 50% relative humidity.

7-6.2.1. Effect of Temperature. Increases in temperature will shorten application and cure time. Conversely, lower temperatures will lengthen application time and cure time. For polysulfide sealants, each 18°F (10°C)

increase in the temperature above 75°F (24°C), cuts the application time by approximately half, with a similar reduction in tack-free and cure time. Similarly, for each 18°F (10°C) decrease in the temperature below 75°F (24°C), the application time is approximately doubled with a similar increase in tack-free and cure time. Tack-free and cure times may increase for polythioether sealants (e.g. AMS 3277) at temperatures below 40°F (4°C).

7-6.2.2. Effect of Humidity. When sealants, especially polysulfides, are applied in an environment where the humidity is greater than 50% RH, application time is shortened to some degree; when humidity is less than 50% RH, application time and cure time may be extended. Polythioether sealants (e.g. AMS 3277) cure independent of humidity conditions.

7-6.2.3. Tack-Free Condition. Sealant is considered to be in a tack-free condition if, when lightly touched, the sealant does not transfer onto the skin.

7-6.3. STORAGE INSTRUCTIONS. When large quantities of sealant are used, it may be advantageous to pre-mix and freeze the sealant to provide a ready supply of mixed sealant when it is needed.

7-6.3.1. Two-part kits and Semkit or Techkit package sealants shall be stored according to instructions on the container.

7-6.3.2. Polythioether sealants (e.g. AMS 3277) require extremely low temperature refrigeration at -80°F (-62°C) or below for optimal retention of application properties.

7-6.3.3. Polysulfide sealants in a pre-mixed and frozen (PMF) form shall be stored in a freezer at -40°F (-40°C) or below for optimal retention of application properties.

7-6.3.4. Thawing of PMF can be accomplished in two ways.

a. For ambient temperature thaw, place the PMF cartridge in a vertical position. Let stand at ambient temperature for approximately 30 minutes. Dry any condensation from the exterior of the cartridge prior to use.

b. For water bath thaw, place the PMF cartridge upright in a 120°F (49°C) water bath for approximately 4-6 minutes with the plunger cup out of the water bath. Upon removal from the bath, carefully dry the exterior of the cartridge before using.

Table 7-2. Time Requirements for Two Component Sealants

Specification	Type or Class*	Application or Assembly Time (hr) **	Tack-Free Time (hr)	Cure Time (hr)	Application Method(s)
MIL-PRF-81733 Class 1	I-1/2	1/2	16	7 days	Brush
	I-2	2	24	7 days	Brush
	II-1/2	1/2	16	14 days	Gun or spatula
	II-2	2	24	14 days	Gun or spatula
	II-4	4	----	14 days	Gun or spatula
	III-1	1	8	7 days	Spray
	IV-12	12	----	14 days	Gun or spatula
	IV-24	24	----	21 days	Gun or spatula
	IV-48	48	----	56 days	Gun or spatula
AMS-S-8802 (supersedes MIL-S-8802)	A-1/2	1/2	10	40	Brush
	A-1	1	20	55	Brush
	A-2	2	40	72	Brush
	B-1/2	1/2	10	30	Gun, spatula, brush, or roller
	B-1	1	20	55	Gun, spatula, brush, or roller
	B-2	2	40	72	Gun, spatula, brush, or roller
	B-4	4	48	90	Gun, spatula, brush, or roller
	C-8	8 (20)	----	168	Gun or spatula
	C-24	24 (80)	----	28 days	Gun or spatula
AMS 3265	B-1/2	1/2	12	32	Gun or spatula
	B-2	2	24	72	Gun or spatula
	C-8	8 (24)	96	168	Gun, spatula, brush, or roller
	C-48	48 (168)	----	56 days	Gun, spatula, brush, or roller
AMS 3276 (supersedes MIL-S-83430)	A-1/2	1/2	10	30	Brush
	A-2	2	24	72	Brush
	B-1/4	1/4	6	16	Gun or spatula
	B-1/2	1/2	10	30	Gun or spatula
	B-2	2	24	72	Gun or spatula
	B-4	4	36	90	Gun or spatula
	B-6	6	48	120	Gun or spatula
	C-1/2	1/2	10	30	Brush or spatula
	C-2	2	24	72	Brush or spatula
	C-8	8 (20)	96	----	Brush or spatula
AMS 3277 (supersedes MIL-S-29574)	A-1/4	1/4	1	2	Brush
	A-1/2	1/2	3	4	Brush
	A-2	2	12	16	Brush
	B-1/4	1/4	1	2	Gun or spatula
	B-1/2	1/2	3	4	Gun or spatula
	B-2	2	12	16	Gun or spatula
	C-4	4	24	30	Brush or spatula
AMS 3284 (supersedes AMS 3267)	A-1/2	1/2	10	24	Brush
	A-2	2	24	72	Brush
	B-1/2	1/2	10	24	Gun or spatula
	B-2	2	24	72	Gun or spatula
<p>* The number after the letter indicates the room temperature application time (in hours) of the sealant after it is mixed.</p> <p>** Assembly time in (). If not noted, the application time and the assembly time are the same.</p> <p>NOTE: Times apply to environmental conditions of 75°F (24°C) and 50% RH.</p> <p>See paragraph 7.6.1 for time adjustments for other environmental conditions.</p>					

WARNING

MIL-T-81772 Type I thinner solvent is flammable. Never store, open, or apply near ignition sources (e.g. lighted cigarettes, sparks, electrical arcing, or heat sources).

7-6.4. **MIXING MIL-PRF-81733 TYPE III (SPRAY APPLICATION)**. MIL-PRF-81733 Type III has a tendency to settle out during storage. The base compound shall be thoroughly mixed, using a standard paint shaker, to obtain a uniform consistency before the addition of the accelerator. After both components, base and accelerator, have been mixed separately, add the proper amount of accelerator to the base compound and mix the combined materials, preferably with a paint shaker, for at least five minutes. For proper application time and cure, the base compound and accelerator shall be combined in the proper ratio and mixed prior to the addition of any thinners (solvents). After mixing, the sealant may be thinned for spraying to a viscosity of 20 to 25 seconds in a Zahn No. 2 cup (refer to Appendix A) using MIL-T-81772 Type I. A 20 to 30 volume percent addition is usually required. The application time and tack-free time will not change using this solvent blend.

7-7. SEALANT APPLICATION PROCEDURES.

WARNING

To control solvent odor, used rags should be immediately placed in an appropriate HAZMAT container and disposed of per local directives.

7-7.1. **CLEANING**. If the surfaces to be sealed have been contaminated following surface treatment, clean the area with a clean cheesecloth (CCC-C-440), cleaning cloth (AMS 3819), or nonwoven cleaning cloth (CCC-C-46) saturated with solvent (AMS 3167, A-A-59281 Type I or II, or equivalent), beginning at the top of the area to be sealed and working downward. Always pour solvent on the cloth to avoid contaminating the solvent. Dry the surfaces immediately with a clean cloth. Do not allow surface to air dry, as the oil or dirt may remain on the surface and is impossible to remove with a dry cloth. Use a stiff bristle brush to clean around bolts, rivets, or fasteners. Always use a clean cloth as each new area is cleaned.

7-7.2. **PRIMING**. All surfaces to be sealed, with the exception of internal fuel tank surfaces, shall be primed with MIL-PRF-23377 or MIL-PRF-85582 in accordance with Appendix A (Navy) or TM 1-1500-345-23 (Army), and allowed to dry one to two hours at ambient temperatures before sealing.

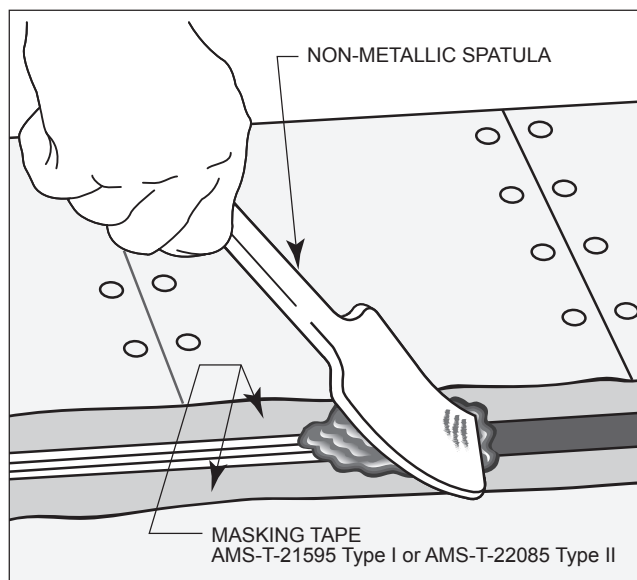


Figure 7-10. Application of Sealant with Non-Metallic Spatula

CAUTION

Avoid surface contamination after cleaning and primer application. Do not contact (hands or tools) area to be sealed.

7-7.3. **MASKING**. To prevent sealant from contacting adjacent areas during application and smoothing out operations, the surrounding area not being sealed can be masked off with AMS-T-21595 Type I masking tape (Figure 7-10). In cases where the tape is likely to remain in place for more than two days on items exposed to direct sunlight and where tape residue on the surface cannot be tolerated, use AMS-T-22085 Type II preservation and sealing tape. Use of masking tape is recommended during fillet sealing of exterior surface lap and butt seams.

NOTE

Always pour solvent onto a new cloth to avoid contaminating the solvent supply. Clean one small area at a time. Reclaimed solvents or soiled cleaning cloths shall not be used.

7-7.4. **ADHESION PROMOTER**. If adhesion promoter is required, the surfaces shall be cleaned with a solvent (AMS 3167, A-A-59281 Type I or II, or equivalent) immediately before applying adhesion promoter. Contaminants such as dirt, grease, and/or lubricants shall be removed to insure good adhesion. Apply a

very thin coat of the adhesion promoter to the solvent cleaned surface with a clean cloth (AMS 3819), wipe off any excess with a clean cloth, and allow the surface to dry for 30 minutes to one hour. If wetting of the surface with a water-based promoter (e.g. AMS 3100) does not occur, it may be necessary to substitute an approved solvent-based promoter. If the surface becomes contaminated or sealing is not accomplished within an hour after application and drying of adhesion promoter, repeat cleaning procedure and reapply adhesion promoter.

WARNING

Sealants, with the exception of ePTFE sealing tapes, are toxic; therefore, rubber or polyethylene gloves and goggles shall be worn when using these materials. Wash hands thoroughly with soap and water before eating or smoking.

7-7.5. BRUSH, SPATULA, OR SEALANT GUN APPLICATION. Prior to masking and sealing, prepare surface in accordance with paragraphs 7-7.1 and 7-7.2

CAUTION

Avoid surface contamination after cleaning and primer application. Do not contact (hands or tools) area to be sealed.

a. To prevent sealant from contacting adjacent areas during application and smoothing, outline the areas being sealed with masking tape (AMS-T-21595 Type I) so that each tape strip is $\frac{1}{8}$ to $\frac{1}{4}$ inch from the edge of the seams (see Figure 7-10).

b. If required, apply adhesion promoter in accordance with paragraph 7-7.4.

c. Apply sealant between tape strips.

(1) Paste sealants may be applied with a nonmetallic spatula or spreader as shown in Figure 7-10. Avoid the entrapment of air. Work sealant into recesses by sliding the edge of the spatula firmly back over the recesses. Smoothing will be easier if the nonmetallic spatula is first dipped in water.

(2) Sealant applied with a brush is applied and smoothed until the desired thickness is reached.

(3) Sealant applied with a sealant gun does not usually require masking and is especially adaptable to filling seams or the application of form-in-place gaskets.

d. Remove masking tape after the sealant has been applied and before it becomes tack-free. Cure time depends upon the application life of the materials used.

e. If tape residue on the surfaces is excessive, remove residue using aliphatic naphtha (TT-N-95 Type II) or equivalent.

f. After sealant no longer feels tacky, prime with MIL-PRF-23377, MIL-PRF-85582 or other primers as specified. Apply topcoat if specified.

7-7.6. SPRAY GUN APPLICATION. Prior to masking and sealing, prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.

CAUTION

Avoid surface contamination after cleaning and primer application. Do not contact (hands or tools) area to be sealed.

a. Mask off adjacent areas with barrier material (MIL-PRF-131) held in place with masking tape (AMS-T-21595 Type I) or preservation tape (AMS-T-22085 Type II).



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b. Apply MIL-PRF-81733 Type III sealant in a solid, continuous pattern when spraying over seams whose configuration is less than 14 inches apart. On seam connections greater than 14 inches apart, minimize overspray to adjacent areas.

c. The dried film of the spray sealant shall be 0.006 +/- 0.001 inch thick.

d. Allow at least four hours for the spray sealant to dry before subsequent processing.

7-7.7. ePTFE SEALING TAPE (Skyflex™), PEEL AND STICK APPLICATION. Prior to application, prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.

CAUTION

Avoid surface contamination after cleaning and primer application. Do not contact (hands or tools) area to be sealed.

a. Examine faying surfaces to be sealed and build up any uneven areas on the aircraft frame with compensation tape (P/N GSC-21-95158-011 or equivalent) to create a level faying surface for panel sealing.

b. Select from Skyflex™ P/Ns GSC-21-95201-0111, GSC-21-95241-011, GSC-21-95261-011, GSC-21-98006-021, GSC-21-95811-022, GUA-1059-1, GUA-1301-1, or equivalent. The sealant tape should cover the full width of the faying surface to be sealed.

c. Measure and cut the desired length of ePTFE sealant tape that is required. Excess tape width should be trimmed to the width of the faying surface.

d. For corners on aircraft/panels, cut ends of tape at approximately a 30 degree angle so that the sealant tape from the converging side will overlap by a minimum of one quarter to one half inch. The overlap is required to assure a complete perimeter seal; butt joints are not acceptable and will allow moisture intrusion and potential corrosion. Do not fold the tape in corners. This will result in triple layer thickness which may adversely affect environmental sealing capability.

e. Tape may be applied to either the aircraft frame or panel faying surface. Application of tape to the panel faying surface is recommended, especially for panels in corrosion prone areas of the aircraft, for ease of subsequent airframe corrosion inspections.

CAUTION

Do not pull or stretch the ePTFE tape as it is applied. The stretched ePTFE tape will retract even if it is clamped between faying surfaces which may reduce or eliminate overlaps and allow water intrusion.

f. Peel the nonstick backing paper off the sealant tape a little at a time as the tape is applied to the aircraft/panel.

(1) Applying extra pressure to the sealant tape will cause the pressure sensitive adhesive to better adhere to the faying surface and will create indentations/dicoloration at the fastener holes allowing for easy identification.

(2) For some areas and fasteners, it may be necessary to pre-punch holes in the sealant tape at the fastener locations. To locate holes and avoid mismatch, either use the panel as a template for hole locations or hold sealant tape in place and use pressure to create discoloration at fastener holes. Pre-punch using a leather punch with a diameter no greater than ¼ inch more than the fastener hole diameter.

g. If sealant without adhesive backing has been ordered for use in areas where fluid exposure is expected, MMM-A-189 plastic adhesive, or equivalent, may be used to hold the ePTFE sealing tape in place. Apply adhesive to airframe sill or panel and apply ePTFE sealing tape within 20 minutes after adhesive application, before adhesive is tack free.

h. After applying the full length of the sealant tape, run fingers back and forth on the sealant to press tape against the aircraft structure/panel surface to activate adhesive and identify fastener holes. No curing time is required.

i. Puncture all fastener holes using an object with a sharp point such as an awl/scribe or scissors.

NOTE

As fasteners are installed, the ePTFE sealant material pushed into the fasteners will help to seal against moisture intrusion.

j. Install access panel. All fasteners shall be wet installed with corrosion preventive compound (MIL-PRF-16173 Grade 4 or equivalent) as specified in the aircraft maintenance manual.

7-7.8. REINFORCED POLYURETHANE GEL SEALING TAPE (HI-TAK TAPE® TUFSEAL™), PEEL AND STICK APPLICATION. These materials are currently approved only for floorboard applications on platforms where their use has been authorized. Prior to application, prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.

CAUTION

Avoid surface contamination after cleaning and primer application. Do not contact (hands or tools) area to be sealed.



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a. Examine surfaces to be sealed and build up any uneven areas on the floorboard frame with MIL-PRF-81733 Type II-1/2 sealant (preferred), AMS 3255 compensation tape (P/N GSC-21-95158-011 or equivalent), or AMS 3277 sealant to create a level faying surface for sealing.

b. The reinforced polyurethane gel sealant tape should cover the full width of the surface to be sealed. Apply tape directly from supplied roll onto floorboard support structure/spar.

c. Install tape with the tacky polyurethane side of the tape applied to the surface. The top side of the tape is covered with a translucent protective film that remains on the tape.

d. Create butt joints at floorboard spar joints. Do not overlap tape sections, but make sure gaps are less than $\frac{1}{8}$ inch at the butt joints. A slight excess of tape ($\frac{1}{8}$ to $\frac{1}{4}$ inch) is preferred over insufficient tape to cover the mating surface.

e. There is no need to pre-punch fastener holes prior to installation of floorboard panels.

NOTE

As fasteners are installed, the polyurethane gel will help to seal against moisture intrusion.

f. Install floorboard panels. All fasteners shall be wet installed with corrosion preventive compound (MIL-PRF-16173 Grade 4 or equivalent) as specified in the aircraft maintenance manual. Fasteners may be pushed through the tape by applying pressure to the fastener with the installation tool.

7-8. SEALING OF SPECIFIC AREAS.**CAUTION**

Do not use any two-part sealant after it has been mixed and its rated application time has expired, as poor adhesion may result.

To determine if a sealant is suitable for a specific application, review the guidelines provided in Table 7-1 and Figure 7-1.

7-8.1. FAYING SURFACE SEALING. Faying surfaces are sealed by applying sealants to the contacting surfaces of two or more parts (Figure 7-11). It is a very effective seal and should be used for all assembly or reassembly. When possible, it should be used in conjunction with fillet sealing. There are two types of faying surface seals, removable and permanent. Removable seals are used around access doors, removable panels, and inspection plates. A removable seal can be formed using a standard sealant on one surface and a parting agent on the mating surface. Permanent seals are created using sealants between permanently fastened structures. To create a permanent seal, coat both mating surfaces with sealant before assembling the parts. Apply enough sealant to force a bead to squeeze out along the joint after assembly. Assemble parts and torque fasteners within the rated application life of the sealant.

NOTE

Avoid air bubbles as much as possible during the sealing operation. Allow the sealant to cure to at least the tack-free stage before moving the assembly.



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a. All faying surfaces, seams, and lap joints shall be protected with MIL-PRF-81733 sealant (or sealant specified in aircraft specific manual). Apply the sealing compound to one or both surfaces, approximately $\frac{1}{32}$ inch thick. If sealing is impossible because of mechanical or other factors, prime both surfaces with two coats of MIL-PRF-23377 or MIL-PRF-85582 in accordance with Appendix A (Navy) or TM 1-1500-345-23 (Army).

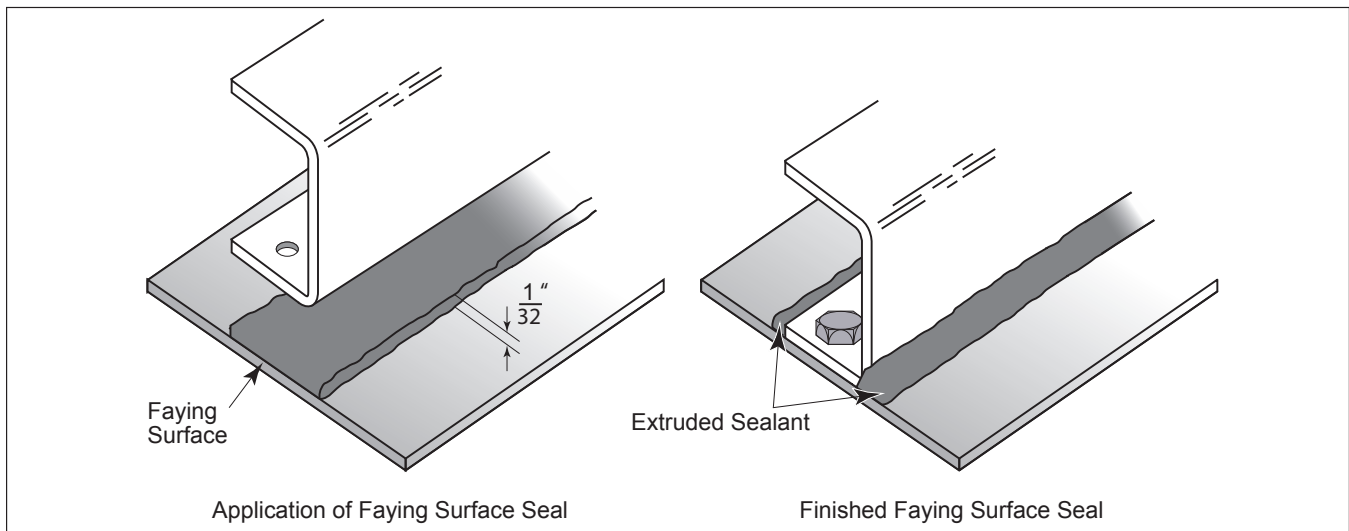


Figure 7-11. Faying Surface Sealing

b. Squeeze the parts together to ensure the complete coating of the entire surface. Sealant shall be continuously extruded along the entire joint. Excess material squeezed out shall be removed so that a fillet seal remains. The fillet width shall be at least $\frac{1}{4}$ inch.

c. Joint areas which could hold water shall be fillet sealed with MIL-PRF-81733 (or aircraft specific) sealant (see paragraph 7-8.2).

d. Install fasteners with sealant within the work life time limit of the sealant.

e. Faying surfaces that are to be adhesively bonded shall be treated and processed as specified by the approved bonding procedure in the applicable maintenance manual.

f. For plastic components, the joint shall be suitably sealed and faired into the adjacent surfaces with MIL-PRF-81733 sealant, unless otherwise specified in the applicable maintenance manuals, to stop the formation of pockets which entrap moisture and dirt. MIL-PRF-81733 sealant shall be used for rivets that require wet installation on plastic components

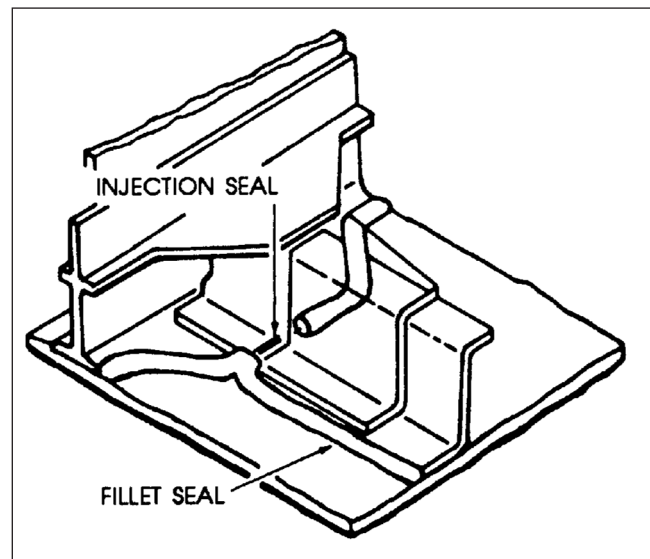


Figure 7-12. Typical Fillet Seal

7-8.2. **FILLET SEALING.** The fillet, or seam seal, shown in Figure 7-12, is the most common type found on an aircraft. Fillet seals are used to cover structural joints or seams along stiffeners, skin butts, walls, spars, and longerons, and to seal around fittings and fasteners. This type of seal is the most easily repaired. Fillet sealing shall be used in conjunction with faying surface sealing, or alone if the assembly sequence restricts the use of faying surface sealing.

7-8.3. **INJECTION SEALING.** This type of seal, shown in Figure 7-13, is used primarily to fill voids created by structural joggles, gaps, and openings. Use only those sealants recommended by the aircraft/equipment manufacturer. Clean the voids of all dirt, chips, burrs, grease, and oil before injection sealing. Force sealant into the area using a sealant gun. This method produces a continuous seal when it is impossible to lay down a continuous bead of sealant while fillet sealing.

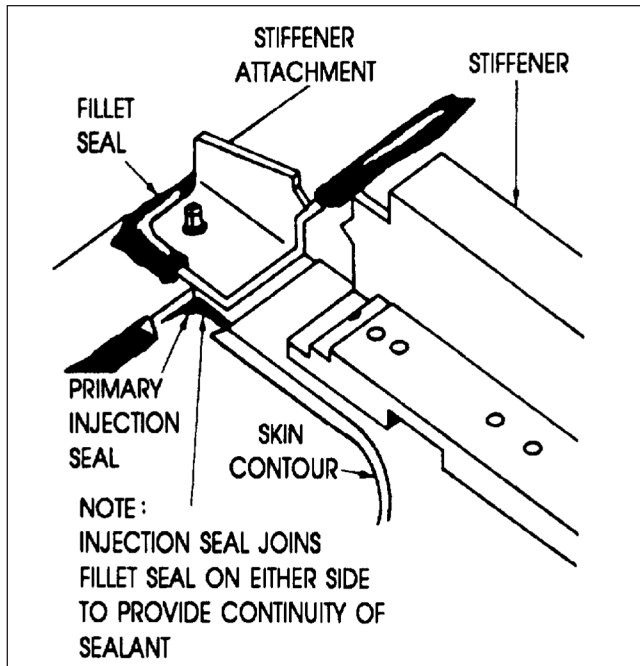


Figure 7-13. Typical Injection Seal

7-8.4. **FASTENER SEALING.** Figure 7-14 illustrates techniques used to seal different types of fasteners. Fasteners are sealed either during assembly or after assembly.

a. To seal during assembly, apply the sealant to the hole or dip the fastener into sealant, and install fastener while sealant is wet. Fasteners in permanent structures shall be wet installed in accordance with the aircraft maintenance manual. For removable parts, coat the lower side of the fastener head only. Do not coat the hole or the fastener shank or threads, as this makes future removal almost impossible without damage to the part.

b. To seal after assembly, cover the pressure side of the fastener with sealant after installation. As a general rule, sealant should be approximately $\frac{1}{8}$ inch thick over the top of the fastener, and extend a minimum of $\frac{1}{4}$ inch from the edge of the fastener onto the surface of the part (see Figure 7-14).

c. Corrosion damaged areas in the countersinks around removable and fixed fasteners may be filled with the fastener in place. Cadmium coated fasteners that have been blasted or abraded during corrosion removal shall be primed in accordance with Appendix A (Navy) or TM 1-1500-345-23 (Army) and coated with MIL-PRF-81733 sealant.

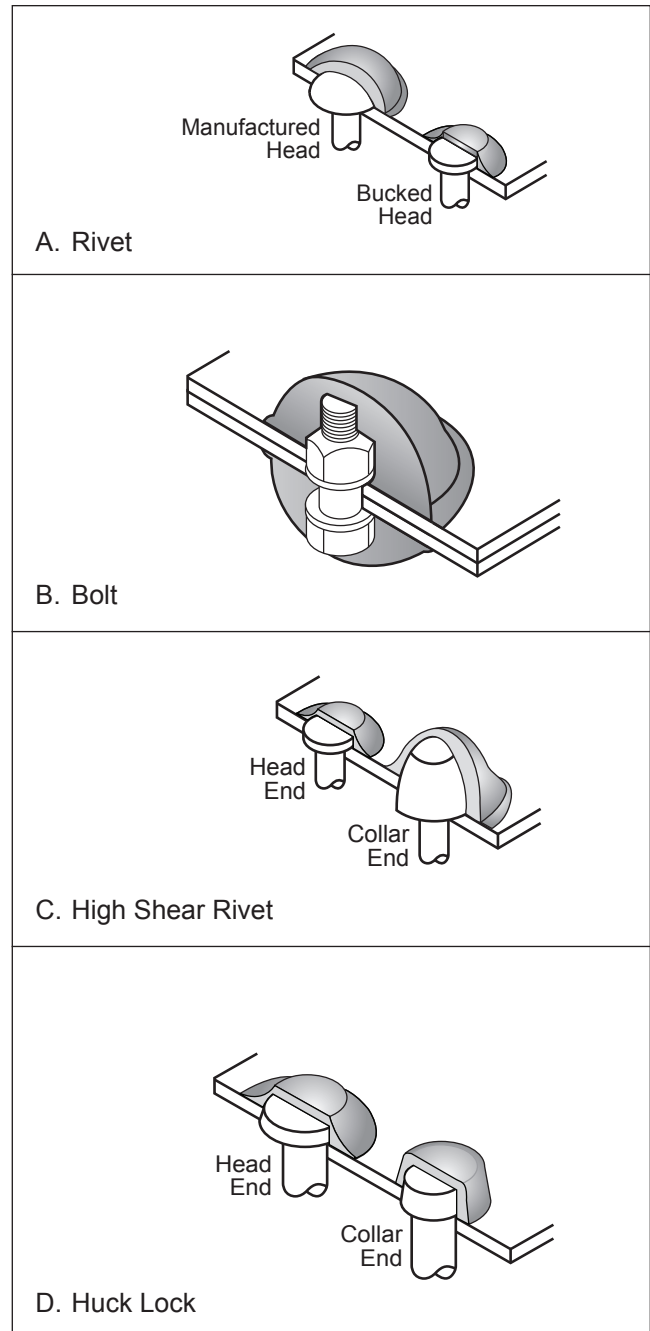


Figure 7-14. Typical Methods of Sealing Fasteners

WARNING

MIL-PRF-81733 is not suitable for use on the inside of integral fuel tanks and shall not be used for these applications. AMS-S-8802 and AMS 3276 are the authorized sealants for the inside of integral fuel tanks of most aircraft platforms. AMS 3277 may be used for repair of integral fuel tanks only if recommended adhesion promoter is used during the repair. Adhesion of repair sealant is critical as disbond of repair sealant during aircraft operation could cause clogging of fuel filters and result in loss of aircraft or personnel.

CAUTION

AMS-S-8802, AMS 3276, or other fuel tank sealants should not be exposed to fuel or overcoated until tack-free.

7-8.5. **FUEL CELLS.** Refer to NAVAIR 01-1A-35, TM 1-1500-204-23-1, or applicable Structural Repair Manual (SRMs) for sealant procedures.

7-8.6. **EXTERNAL AIRCRAFT STRUCTURE.** If, during normal maintenance, it becomes necessary to remove and replace components (wing planks, skin, spar caps, fasteners, or fittings), they shall be sealed when reinstalled, even if they were not sealed originally. The only exception to this requirement is temporary repair accomplished for a one time flight to a Depot or overhaul facility.

7-8.6.1 **Lap Skin Sealing.**

7-8.6.1.1 In areas where skins have been lifted (see Figure 7-15 View A), repair as follows:

- a. Prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.
- b. Apply MIL-PRF-81733 sealant to both sides of faying surface (see paragraphs 7-8.1.a.-d.).
- c. Wet install fasteners with MIL-PRF-81733 sealant.
- d. Fillet seal external seams with MIL-PRF-81733 sealant.
- e. After sealant cures, prime with MIL-PRF-23377, MIL-PRF-85582 or other primers as specified. Apply topcoat if specified.

7-8.6.1.2 In areas where joints have not been opened (see Figure 7-15 View B), repair as follows:

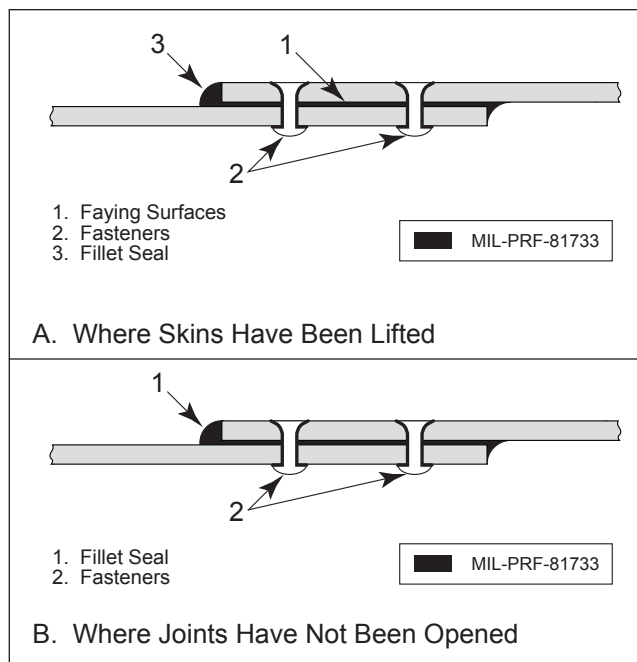


Figure 7-15. Typical Lap Skin Sealing

- a. Prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.
- b. Fillet seal external seams with MIL-PRF-81733 sealant.
- c. Wet install fasteners with MIL-PRF-81733 sealant.
- d. After sealant cures, prime with MIL-PRF-23377, MIL-PRF-85582 or other primers as specified. Apply topcoat if specified.

7-8.6.2 **Sealing Aircraft Fittings.** (See Figure 7-16.)

- a. Remove corrosion and treat surface in accordance with Chapters 4 and 5.
- b. Prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.
- c. Apply MIL-PRF-81733 sealant to both sides of faying surface (see paragraphs 7-8.1.a.-d.).
- d. Wet install fasteners with MIL-PRF-81733 sealant.
- e. Fillet seal external seams with MIL-PRF-81733 sealant.
- f. After sealant cures, prime with MIL-PRF-23377, MIL-PRF-85582 or other primers as specified. Apply topcoat if specified.

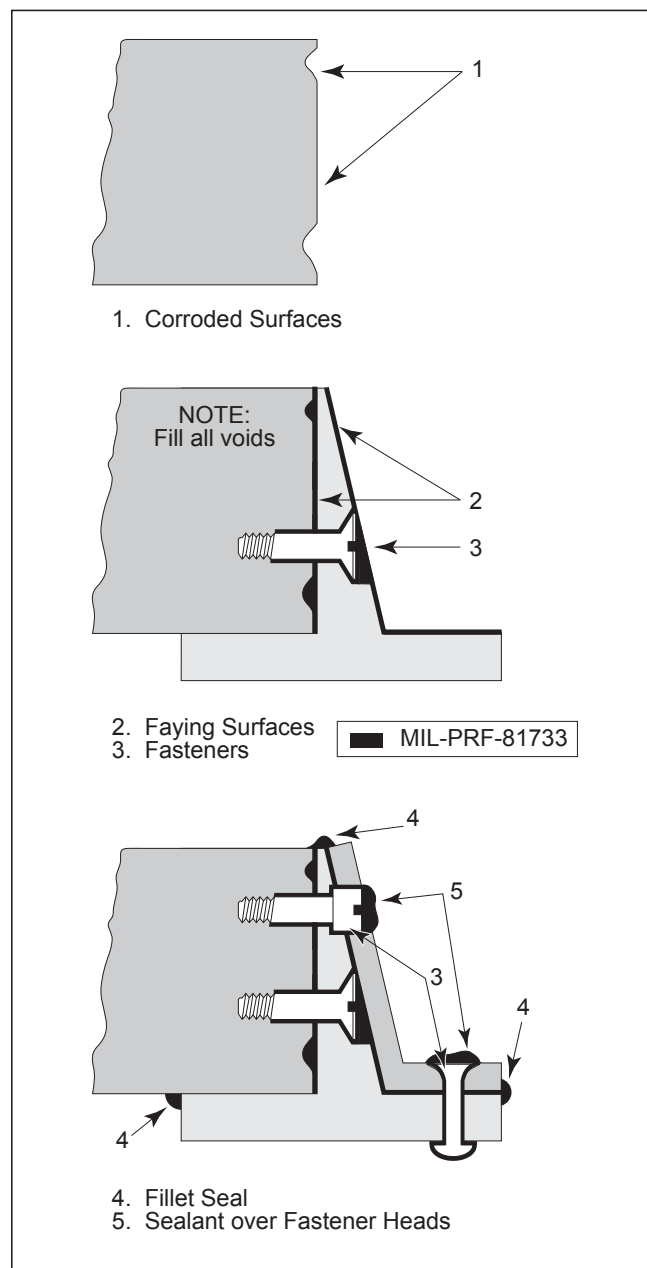


Figure 7-16 Sealing Procedures for Typical Aircraft Fitting

7-8.6.3 Spar Cap Sealing. (See Figure 7-17.)

- a. Remove corrosion and treat surface in accordance with Chapters 4 and 5.
- b. Prepare surface in accordance with paragraphs 7-7.1 and 7-7.2.
- c. Apply MIL-PRF-81733 sealant to both sides of faying surface (see paragraphs 7-8.1.a.-d.).
- d. Wet install fasteners with MIL-PRF-81733 sealant.
- e. Fillet seal external seams with MIL-PRF-81733 sealant.
- f. Coat entire spar cap and fastener area with MIL-PRF-81733 sealant, filling all depressions.
- g. After sealant cures, prime with MIL-PRF-23377, MIL-PRF-85582 or other primers as specified. Apply topcoat if specified.

7-8.6.4 Sealing Access Doors. (See Figure 7-18.)

- a. Dry Bay Access Doors and Semi-Permanent Fittings: Install fasteners wet with AMS 3284 sealant under fastener head only. Tighten fasteners and fillet seal door with AMS 3284 sealant.
- b. Fuel Tank Access Doors with O-Rings: Install o-ring. Install fasteners wet with AMS 3284 sealant under fastener head only. Fillet seal door with AMS 3284 sealant.
- c. Fuel Tank Access Doors without O-Rings: Seal faying surfaces with AMS 3284 sealant. Install fasteners wet with AMS 3284 sealant under fastener head only. Fillet seal door with AMS 3284 sealant.

7-8.7. **DEPRESSIONS.** When the thickness of metal is reduced by more than 15 mils (0.015 inch) during removal of corrosion damage, apply chemical conversion coating (MIL-DTL-81706) and prime the surface (MIL-PRF-23377 or MIL-PRF-85582). Fill the depression with MIL-PRF-81733 Type II sealant. Depressions on surfaces that will be sealed with AMS3255 sealing tape require filling with compensation tape (see paragraph 7-7.7). Depressions on the inside of integral fuel tanks do not require filling.

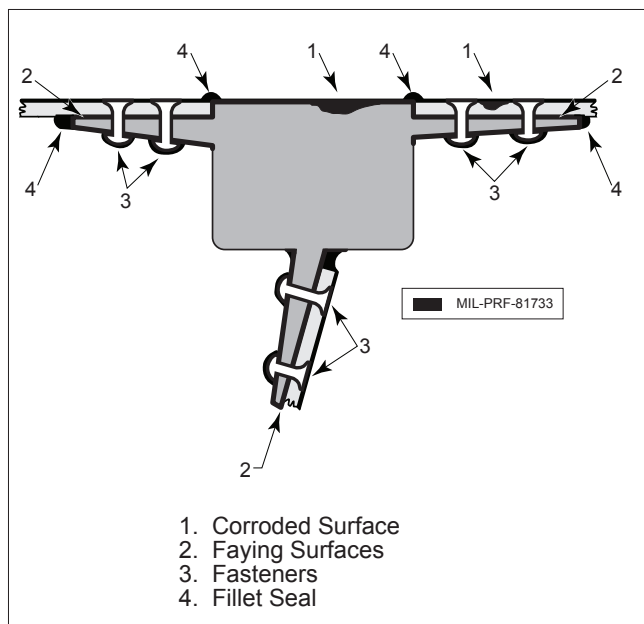


Figure 7-17. Typical Spar Cap Sealing

7-8.8. EXTENSIVE CORROSION REPAIR. If corrosion damage is so extensive that structural repair is necessary, all faying surfaces between patches (or doublers) and skins shall be painted with one coat of MIL-PRF-23377 or MIL-PRF-85582 primer. When the primer is dry, coat with MIL-PRF-81733 sealant prior to installation of the patch. Permanently installed fasteners shall be wet installed with MIL-PRF-81733 prior to installation. Removable panel fasteners shall be wet installed with AMS 3284.

7-8.9. HIGH TEMPERATURE AREAS. In areas where high temperatures are expected, MIL-A-46146 Group III or AMS 3374 Type I shall be used for sealing. Application of these sealants is similar to spatula applied sealants (refer to paragraph 7 7.5).

7-8.10. LOW TEMPERATURE CURING. When cold climates interfere with sealing operations by prolonging the sealant curing reaction, use AMS 3277 Type I. Adhesion promoter is required when sealing with AMS 3277. AMS3255 (ePTFE sealing tape) may be used in approved applications, as it does not require curing.

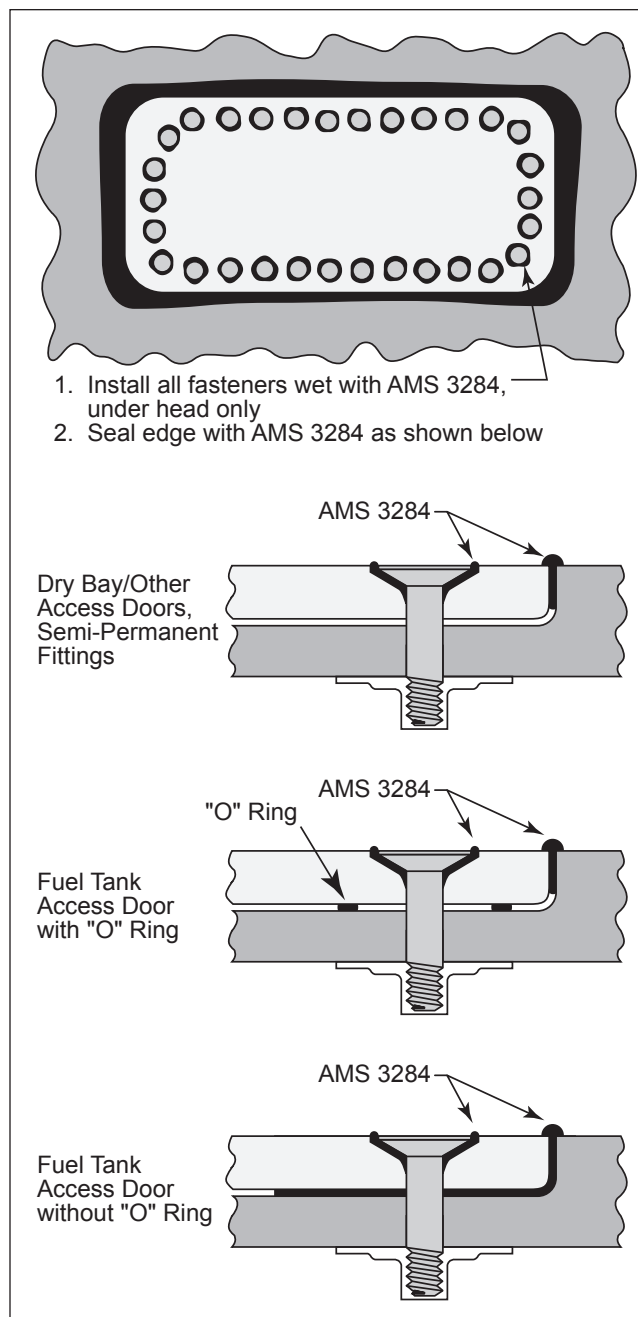


Figure 7-18. Sealing of Access Doors

7-9. REPAIR OF DAMAGED SEALANT.

7-9.1. DAMAGED SEALANT. Many areas on aircraft are sealed either at the factory or by Depots during rework. Fresh sealant shall be applied whenever the previously applied sealant is damaged.

a. Remove the damaged sealant with a plastic scraper or mechanical sealant removal tool (paragraph 7-5.5.) and, if necessary, prepare the metal surface in accordance with Chapter 5.

b. Slightly roughen a strip of the undamaged sealant approximately one inch wide around the boundary of the stripped area using an abrasive cloth.

c. Clean the area with solvent (AMS 3167 or approved equivalent) using a clean cloth (AMS 3819) or cheesecloth (CCC-C-440).

d. Apply the new sealant by brush or spatula (see paragraph 7-7.5) onto smaller areas, or by spraying (see paragraph 7-7.6) onto larger areas. The new sealant shall overlap the existing coating onto the roughened area.

7-9.2. FORM-IN-PLACE SEALANT REPAIR.

a. Remove all loose sealant material, and thoroughly clean the area to be resealed (see paragraph 7-7.1). Areas of old seal to which new sealant will be added shall be cleaned and abraded using an abrasive mat or abrasive cloth to expose a clean, fresh surface.



Sealing and Coating Compound 12
Corrosion Inhibiting
MIL-PRF-81733

b. Apply MIL-PRF-81733 Type II-1/2 or aircraft specific sealant, preferably with a sealant gun. The new sealant should match the configuration of the removed sealant but should be of sufficient depth to ensure contact with the mating surface.

c. Apply a very thin film of release agent (see paragraph 7-4.7) to the nonstick mating surface and close the access door.

d. Do not open the door for a minimum of 24 hours or the published tack free time of the aircraft specific sealant.

7-9.3. ePTFE SEALING TAPE (Skyflex™) REPAIR.

In order to preserve sealant integrity, it is necessary to inspect the sealant tape each time an access panel is removed.

NOTE

The main function of the adhesive backing is to hold the ePTFE sealant tape in place. Peeling/delamination of the adhesive from the aircraft structure/panel requires replacement of any section of the sealant tape that is not located in the faying surface.

a. Visually inspect the ePTFE sealant material for nicks, cuts, gouges and delamination/separation.

b. Cut and remove only the damaged section of the sealant tape. Lift the damaged tape section from the surface and cut with scissors; do not cut tape directly on surface to avoid damage to airframe.

c. Measure and cut a new piece of sealant tape approximately one inch longer than the removed section.

CAUTION

Ends of repair splice shall overlap the existing sealant to ensure sealant integrity. Use care not to pull or stretch the ePTFE tape as it is applied. The stretched ePTFE tape will retract even if it is clamped between faying surfaces, which may reduce or eliminate overlap and allow water intrusion.

d. Install new sealant tape so it overlaps the previously installed sealant by $\frac{1}{4}$ to $\frac{1}{2}$ inch on each side of the repair site.

e. Once sealant tape is applied, run fingers back and forth on tape to further activate the adhesive. No curing time is required.

(1) Applying extra pressure to the sealant tape will cause the pressure sensitive adhesive to better adhere to the faying surface and it will create indentations/discoloration at the fastener holes allowing for easy identification.

(2) For some fasteners, it may be necessary to pre-punch holes in the sealant tape at the affected fastener locations. Locate holes in repair section and pre-punch using leather punch with diameter no greater than $\frac{1}{4}$ inch more than the fastener hole diameter.

f. If sealant without adhesive backing is used for repair in areas where high fluid exposure is expected, MMM-A-189 plastic adhesive or equivalent may be used to hold the ePTFE sealing tape in place. Apply adhesive to entire length of the repair section and apply ePTFE sealing tape within 20 minutes or before adhesive is tack free.

g. Puncture any affected fastener hole with a sharp pointed object such as an awl/scribe or scissors.

NOTE

As fasteners are installed, the ePTFE sealant material pushed into the fasteners will help seal against moisture intrusion.

h. Install access panel. All fasteners shall be wet installed with corrosion preventive compound (MIL-PRF-16173 Grade 4 or equivalent) as specified in the aircraft maintenance manual.

7-9.4. REINFORCED POLYURETHANE GEL SEALING TAPE (HI-TAK® TAPE TUFSEAL™) REPAIR. In order to preserve sealant integrity, it is necessary to inspect the sealant tape each time a floorboard is removed.

a. Visually inspect the reinforced polyurethane gel sealant tape on floorboard spars for nicks, cuts, gouges, dry appearance, missing gel, and other indications of damage which might compromise sealing integrity.

b. Cut and remove only the damaged section of the sealant tape. Lift the damaged tape section from the surface and cut with scissors; do not cut tape directly on surface to avoid damage to airframe.

c. Clean any residue from the surface using a solvent (AMS 3167, A-A-59281 Type I or II, or equivalent) and cheesecloth (CCC-C-440) or a clean cloth (AMS 3819 or equivalent).

d. Measure and cut a new piece of sealant tape approximately the same length as the removed section.

e. Install new sealant tape, creating a butt joint with remaining tape sections. Do not overlap tape sections, but make sure gaps are less than $\frac{1}{8}$ inch at the butt joints. A slight excess of tape ($\frac{1}{8}$ inch to $\frac{1}{4}$ inch) is preferred over insufficient tape to cover the exposed surface.

f. If the repaired section is over a fastener hole, there is no need to pre-punch fastener holes prior to installation of floorboard panels.

NOTE

As fasteners are installed, the polyurethane gel will help to seal against moisture intrusion.

g. Install floorboard panels. All fasteners shall be wet installed with corrosion preventive compound (MIL-PRF-16173 Grade 4 or equivalent) as specified in the aircraft maintenance manual. Fasteners may be pushed through the tape by applying pressure to the fastener with the installation tool.

7-10. STORAGE AND SHELF LIFE. All sealants have a specified shelf life. The date of manufacture and the expiration date or inspect/test date are listed on each container. The shelf life is based on storing the sealant in its original, unopened container in an area where the temperature does not exceed 60°F (27°C), unless otherwise specified on the package. Prior to use, sealant containers shall be visually inspected to determine if the material has exceeded its expiration date. If the sealant has exceeded the expiration date, dispose of the container in accordance with local regulations. If the sealant has exceeded its inspect/test date, then it shall not be used until update testing has been performed. Procedures for update testing are usually provided in the sealant specification. No sealant shall be used if it fails testing. Minimum update testing can be performed as follows:

a. Select one sample of sealant from each manufacturer's batch of material to be tested for updating.

b. Visually examine the content of each component in the sample. No separation, layering, or settling that does not disperse to a homogeneous mixture when mixed is allowed. If the base compound is lumpy, partially cured, or cannot be mixed with the curing agent, dispose of the opened sample and all kits from that batch of sealant in accordance with local regulations.

c. If the sample can be blended to form a homogeneous mixture, determine whether the application time is suitable for the intended purpose by applying the mixture to a clean piece of scrap aluminum at the application time of the sealant (i.e., B-1/2, apply after 30 minutes). If the sealant is too thick or does not stick to the metal at application time, the sealant is not acceptable. Dispose of the opened sample and all others from that batch in accordance with local regulations.

d. If the application time is acceptable, periodically check the applied sealant for cure time by checking

its hardness. The batch of sealant represented by the applied sealant can be extended if it achieves approximately the same hardness as sealants which are not overaged.

e. This updating process may be repeated for a maximum of three extensions ($\frac{1}{2}$ original shelf life, $\frac{1}{3}$ original shelf life, and $\frac{1}{6}$ original shelf life). Affix an extension label to the container in accordance with FED-STD-793.

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